

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau(43) International Publication Date  
4 November 2004 (04.11.2004)

PCT

(10) International Publication Number  
WO 2004/095319 A3

(51) International Patent Classification<sup>7</sup>: G01J 3/00, G06F 17/30, G06T 1/00, B44D 3/00

(21) International Application Number: PCT/US2004/012233

(22) International Filing Date: 21 April 2004 (21.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 60/464,719 23 April 2003 (23.04.2003) US

(71) Applicant (for all designated States except US): POLY-ONE CORPORATION [US/US]; 33587 Walker Road, Avon Lake, OH 44012 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): RUSSELL, Scott, O. [US/US]; 3386 Burgundy Circle, Avon, OH 44011 (US). BATES, Susan, H. [US/US]; 3338 Greens Ridge Court, Dacula, GA 30019 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, ZW).

GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

## Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations
- of inventorship (Rule 4.17(iv)) for US only

## Published:

- with international search report

(88) Date of publication of the international search report: 2 June 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2004/095319 A3

(54) Title: DIGITALLY MAPPED FORMULAIC COLOR SPACE AND METHOD OF MAKING AND USING SAME

(57) Abstract: A method of mapping color space with chromatic formulations, comprising the steps of (a) selecting a limited number of chromatics for use with a bulk material using selection criteria; (b) formulating the selected chromatics with white or black in the bulk material to generate a plurality of chromatic formulations, wherein such plurality of chromatic formulations populate a desirable volume of color space; and (c) computing additional chromatic formulations using algorithms reflecting the contributions of chromatics, white, and black to color, and incremental substitutions thereof. Optional steps in the method are also disclosed. The result can be a database of generated nodes and computed nodes filling desired regions or even the entirety of color space for a given polymeric bulk material. Usefulness includes the ability to create, store and communicate chromatic formulations for the generated nodes, the computed nodes, or both for use anywhere in the world via electronic commerce of color matching.

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/012233A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G01J3/00 G06F17/30 G06T1/00 B44D3/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 G01J G06F G06T B44D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/97090 A (POLYONE CORPORATION) 20 December 2001 (2001-12-20) cited in the application page 7, line 13 - page 7, line 23 page 8, line 6 - page 8, line 15 page 8, line 29 - page 8, line 31 page 9, line 1 - page 9, line 29; figure 4 -----	1-8,10, 11
X	US 6 011 540 A (BERLIN ET AL) 4 January 2000 (2000-01-04) column 2, line 67 - column 4, line 29 -----	1-8,10, 11
X	US 5 692 071 A (GOVAERT ET AL) 25 November 1997 (1997-11-25) column 1, line 40 - column 2, line 9 column 7, line 26 - column 8, line 18 column 8, line 26 - column 9, line 6; figures 4-6 -----	1-8,10, 11
-/-		

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

## \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

28 February 2005

09/03/2005

Name and mailing address of the ISA  
European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Sartor, M

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/012233

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 626 781 A (EASTMAN KODAK COMPANY) 30 November 1994 (1994-11-30) page 1, line 33 - page 2, line 52; figures 6-9 ----- US 5 121 196 A (HUNG ET AL) 9 June 1992 (1992-06-09) column 2, line 29 - column 3, line 46 column 4, line 19 - column 5, line 25; figures 1,2 ----- US 4 929 978 A (KANAMORI ET AL) 29 May 1990 (1990-05-29) column 4, line 13 - column 5, line 38 column 6, line 27 - column 7, line 51 column 8, line 17 - column 9, line 15; figures 4-6 ----- US 4 887 906 A (KOEHLER ET AL) 19 December 1989 (1989-12-19) column 2, line 16 - column 2, line 63 column 3, line 11 - column 5, line 33; figures 1-3 -----	1-8,10, 11 1-8,10, 11 1-8,10, 11 1-8,10, 11
A	HUA ZENG ET AL: "NEW ALGORITHM FOR OPTIMIZATION OF COMPUTER COLOR MATCHING" OPTICAL ENGINEERING, SOC. OF PHOTO-OPTICAL INSTRUMENTATION ENGINEERS. BELLINGHAM, US, vol. 32, no. 8, 1 August 1993 (1993-08-01), pages 1815-1817, XP000387833 ISSN: 0091-3286 ----- DERBY R E: "COLOR, COLOR MEASUREMENT AND COLORANT FORMULATION IN THE TEXTILE INDUSTRY" TEXTILE CHEMIST AND COLORIST, AM. ASSOC. OF TEXTILE CHEMISTS AND COLORISTS. NORT CAROLINA, US, vol. 5, no. 9, 1 September 1973 (1973-09-01), pages 47-55, XP002022199 ISSN: 0040-490X -----	

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2004/012233

### Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: 9, 12 because they relate to subject matter not required to be searched by this Authority, namely:  
The subject-matter of claims 9, 12 is a mere presentation of information cf. Rule 39.1 (v) PCT, PCT Guidelines 9.11 and 9.12
2.  Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3.  Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

#### Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/012233

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
WO 0197090	A	20-12-2001		US 6772151 B1 CA 2413076 A1 EP 1393202 A2 JP 2004521314 T MX PA02012379 A WO 0197090 A2		03-08-2004 20-12-2001 03-03-2004 15-07-2004 25-04-2003 20-12-2001
US 6011540	A	04-01-2000		NONE		
US 5692071	A	25-11-1997		DE 69317567 D1 DE 69317567 T2 WO 9406242 A1 EP 0659322 A1 JP 3371964 B2 JP 8500945 T		23-04-1998 15-10-1998 17-03-1994 28-06-1995 27-01-2003 30-01-1996
EP 0626781	A	30-11-1994		EP 0626781 A2 JP 7020841 A		30-11-1994 24-01-1995
US 5121196	A	09-06-1992		JP 2226867 A JP 2136848 A JP 2952489 B2		10-09-1990 25-05-1990 27-09-1999
US 4929978	A	29-05-1990		JP 2023776 A JP 2543146 B2 JP 1110154 A JP 1120965 A		25-01-1990 16-10-1996 26-04-1989 12-05-1989
US 4887906	A	19-12-1989		NONE		